

METHOD OF MAKING A LAYERED COMPOSITE ELECTRODE/ELECTROLYTE

ABSTRACT

5 An electrode/electrolyte structure is prepared by a plurality of methods. An unsintered
(possibly bisque fired) moderately catalytic electronically-conductive or homogeneous mixed
ionic electronic conductive electrode material is deposited on a layer composed of a sintered
or unsintered ionically-conductive electrolyte material prior to being sintered. A layer of
10 particulate electrode material is deposited on an unsintered ("green") layer of electrolyte
material and the electrode and electrolyte layers are sintered simultaneously, sometimes
referred to as "co-firing," under conditions suitable to fully densify the electrolyte while the
electrode retains porosity. Or, the layer of particulate electrode material is deposited on a
previously sintered layer of electrolyte, and then sintered. Subsequently, a catalytic material
15 is added to the electrode structure by infiltration of an electrocatalyst precursor (e.g., a metal
salt such as a transition metal nitrate). This may be followed by low temperature firing to
convert the precursor to catalyst. The invention allows for an electrode with high electronic
conductivity and sufficient catalytic activity to achieve high power density in an ionic
(electrochemical) device such as fuel cells and electrolytic gas separation systems.